

Claims.  

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1.- Sorting device, provided with an inspection unit (2),  
5 where products (3-3A) to be sorted are inspected on their  
acceptability, a transport system (4) feeding a product  
flow (5) of products (3-3A) to be sorted to the  
inspection unit (2), and a rejection unit (6) taking  
10 unacceptable products (3-3A) out of the product flow (5),  
characterized in that the inspection unit (2), at the  
sending side, is provided with at least two sources, more  
particularly light sources (17-18-32), for generating  
electromagnetic radiation, more particularly light (L1-  
15 L2-L3), as well as with means, making use of waveguide  
technology, for having the electromagnetic radiation meet  
the products (3-3A) to be sorted, whereby these means  
function as an alignment system for the radiation  
originating from the aforementioned sources (17-18-32).

20 2.- Sorting device according to claim 1, characterized in  
that it is provided with:

- 25 - coupling-in optics (21-22-33) for coupling-in  
radiation, more particularly light (L1-L2-L3), from  
at least two sources, more particularly light sources  
(17-18-32), into optical waveguides (19-20-34);
- a combining unit (23) for combining radiation, more  
particularly light (L1-L2-L3), from these optical  
waveguides (19-20-34) to one radiation beam, light  
30 beam, respectively, in at least one waveguide (24-25-  
35) which then comprises light (L1-L2-L3) of two or  
more of the above-mentioned sources, light sources  
(17-18-32), respectively;
- focussing optics (29-30-36) for focussing the  
radiation beam, more particularly, light beam, onto  
35 the products (3-3A) to be sorted.

3.- Sorting device according to claim 2, characterized in that the light sources (17-18-32) are laser sources.

Q1 5 ~~4.- Sorting device according to claim 2 or 3, characterized in that the light sources (17-18-32) are semiconductor laser sources.~~

10 5.- Sorting device according to claim 4, characterized in that the semiconductor laser sources are cooled by means of a Peltier element.

15 6.- Sorting device according to claim 2 or 3, characterized in that the light sources (17-18-32) are solid matter laser sources.

7.- Sorting device according to any of the preceding claims, characterized in that the light sources (17-18-32) radiate light of a different wavelength.

Q2 20 8.- Sorting device according to any of claims 2 to 7, characterized in that the coupling-in optics (21-22-33) consist of connectorized components.

25 9.- Sorting device according to any of claims 2 to 7, characterized in that the coupling-in optics (21-22-33) are provided with connectors.

30 10.- Sorting device according to any of claims 2 to 9, characterized in that the combining unit (23) comprises dichroic elements.

35 11.- Sorting device according to any of claims 2 to 9, characterized in that the combining unit (23) makes use of fused optical wavelength technology.

~~12.- Sorting device, provided with an inspection unit (2)~~

where products (3-3A) to be sorted are inspected on their acceptability on the basis of a selection which is performed in function of the electromagnetic radiation reflected and/or transmitted and/or emitted and/or transformed by these products (3-3A), a transport system (4) feeding a product flow (5) of products (3-3A) to be sorted to the inspection unit (2), and a rejection unit (6) taking unacceptable products (3A) out of the product flow (5), characterized in that the inspection unit (2), at the detection side, is provided with means which make use of a waveguide selection system for receiving the electromagnetic radiation reflected and/or transmitted and/or emitted and/or transformed by the products (3-3A) to be sorted.

13.- Sorting device according to claim 12, characterized in that the means to receive the light reflected, transmitted, emitted by the products (3-3A) to be sorted and/or the electromagnetic radiation transformed thereby, more particularly light (L1-L2-L3), consist of a bundle of optical waveguides (40).

14.- Sorting device according to claim 13, characterized in that the aforementioned means comprise a bundle (40) of optical waveguides which are placed with their extremities into the image plane (44) of a lens system (43-61), in such a manner that the image formed by the products (3-3A) is projected onto these extremities, or possibly onto an intermediate element which transmits this image onto the bundle (40).

15.- Sorting device according to claim 13 or 14, characterized in that the bundle (40) of waveguides (41-42) is divided into separate parts (45-46-53) which correspond to well-defined portions of the formed image.

16.- Sorting device according to claim 15, characterized in that the bundle (40) of optical waveguides is divided into one or several substantially concentric bundles (45-46-53).

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17.- Sorting device according to claim 15 or 16, characterized in that each of the parts (45-46-53) are separated from each other by means for avoiding cross-coupling between the parts (45-46-53).

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18.- Sorting device according to any of the claims 15 to 17, characterized in that the bundles forming the aforementioned respective parts (45-46-53) are led separately to detectors (50) and/or splitting optics (51).

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19.- Sorting device according to any of the claims 15 to 18, characterized in that several bundles (40-56) consisting of different parts are used after the image has been divided into two or more images by means of splitting optics (55).

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20.- Sorting device according to claim 19, characterized in that the splitting optics (55) in their turn have outgoing waveguides.

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21.- Sorting device according to any of claims 12 to 20, characterized in that the optical waveguides consist of fibers with a large core diameter/mantle diameter ratio and/or a high numerical aperture.

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22.- Sorting device according to any of the preceding claims, characterized in that the inspection unit (2), as well at the sending side as at the detection side, is provided with means making use of waveguide technology.

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23.- Sorting device, provided with an inspection unit (2) where products (3-3A) to be sorted are inspected on their acceptability, a transport system (4) feeding a product flow (5) of the products (3-3A) to be sorted to the inspection unit (2), and a rejection unit (6) taking unacceptable products (3-3A) out of the product flow (5), characterized in that the inspection unit (2) is provided with a bundle (40) of waveguides and/or is provided with one or more waveguides, whereby the bundle (40) for the sending part and the detection part of the inspection unit (2) is common and/or the one or more waveguides for the sending part and the detection part of the inspection unit (2) are common.

24.- Sorting device according to claim 23, characterized in that one and the same image forming system, more particularly lens system (61), is used for focussing the emitted radiation, more particularly the emitted light, onto the products (3-3A) and for focussing the radiation received again, more particularly the light received again, onto the waveguides.

96<sub>25</sub> 25.- ~~Sorting device~~ according to claim 23 or 24, characterized in that at the sending side and/or detection side of the inspection unit (2), use is made of two or more waveguide systems.

26.- ~~Sorting device~~, characterized in that it shows a combination of characteristics of two or more of the claims 1 to 25.